

REMARKS

Rejections under 35 USC §102(b)

Claims 1, 3 and 11 were rejected under 35 USC §102(b) as being anticipated by Suovaniemi et al. (U.S. Patent No. 5,343,769).

Claim 1 has been amended to recite, among other things, “providing a liquid discharging apparatus comprising a metering tube having a columnar internal space formed substantially the same diameter, a plunger whose tip face closely contacts an inner wall surface of the metering tube, a storage container filled with the liquid material, a flow passage communicating the metering tube with the storage container, a liquid material supplying valve on the flow passage, a discharge valve disposed at a nozzle side distal end of the metering tube, and a nozzle in communication with the discharge valve; supplying the metering tube with the liquid material by moving the plunger rearward to a first position while the liquid material supplying valves is in the open position and the discharge valves is in the closed position;” “moving the plunger forward from a first position and stopping the plunger at a second position while the liquid material supplying valve is in the closed position and the discharge valves is in the open position, thereby discharging a first droplet from the nozzle;” “moving the plunger forward from the second position and stopping the plunger at a third position while the liquid material supplying valve is in the closed position and the discharge valves is in the open position, thereby discharging a second droplet from the discharge port;” and “wherein the liquid material supplied in the metering tube in a single supplying step is discharged from the discharge port in a plurality of steps of moving the plunger forward.”

The amendment is supported in the original disclosure, for example, at Fig.3A, Fig.3B and [0028] of U.S. publication.

Thus, according to the present invention, **a single charge of the liquid material in the metering tube is discharged into a plurality of droplets through a plurality of steps of moving the plunger forward.**

In contrast, Suovaniemi et al teaches the method where a single charge of the liquid material is discharged in a single step of moving the plunger forward. Suovaniemi et al describes as follows:

The terminal deceleration is useful for the reason that owing to the tapering shape of the pipette's tip portion the velocity at which the level of the liquid discharges from the tip rises to very great height towards the end if the piston moves at uniform velocity, and because of this high velocity some liquid may remain on the inner surface of the liquid volume 6.

(Suovaniemi et al, col. 6, lines 3-9). According to this description, Suovaniemi et al simply teaches speed control about tapering shape structure. Suovaniemi et al does not teach or suggest “moving the plunger forward from a first position and stopping the plunger at a second position while the liquid material supplying valve is in the closed position and the discharge valves is in the open position, thereby discharging a first droplet from the nozzle;” “moving the plunger forward from the second position and stopping the plunger at a third position while the liquid material supplying valve is in the closed position and the discharge valves is in the open position, thereby discharging a second droplet from the discharge port.”

Suovaniemi et al further describes as follows:

The powerful deceleration caused by the abrupt stopping results in a clean, and reproducible, break of the liquid column discharging from the liquid volume 6 exactly at the end of the tip piece, without causing any droplets to cling to its outside surface.

(Suovaniemi et al, col. 6, lines 10-14). This indicates that Suovaniemi et al discusses that all the liquid in the liquid volume 6 is discharged in a single forward movement. Thus, Suovaniemi et al does not teach or suggest, among other things, “wherein the liquid material supplied in the metering tube in a single supplying step is discharged from the discharge port in a plurality of steps of moving the plunger forward,” as recited in claim 1.

Moreover, claim 1 also recites, “providing a liquid discharging apparatus comprising a metering tube having a columnar internal space formed substantially the same diameter, a plunger whose tip face closely contacts an inner wall surface of the metering tube, a storage container filled with the liquid material, a flow passage communicating the metering tube with the storage container, a liquid material supplying valve on the flow passage, a discharge valve disposed at a nozzle side distal end of the metering tube, and a nozzle in communication with the discharge valve.” Regarding the recitations, the Examiner alleged as follows:

Fischer teaches a plunger (250, figs.7A, 7B) whose tip face closely contacts the inner wall surface of the metering tube (220). A sealing gasket (260) is arranged on the tip portion of the plunger (250) to improve the closeness of the plunger tip to the inner surface of the tube (220).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the sealing gasket of Fischer on the tip portion of the plunger of Suovaniemi et al in order to improve the closeness of the plunger to the inner surface of the tube thereby improving the efficiency of the dispensing device, since air and/or liquid is hindered from passing between the inner surface of tube and the plunger.

(Office Action, page 4).

However, as shown in Fig. 2 of Suovaniemi et al, the upper portion of liquid volume 6 and lower portion of liquid volume 6 communicate with each other through the clearance between the plunger and the cylinder. Therefore, a sealing gasket like Fischer cannot be attached on the tip portion of the plunger of Suovaniemi et al. There is no reason for a person of ordinary skill in the art to combine the sealing gasket of Fischer with the pipette of Suovaniemi et al.

For at least these reasons, claim 1 patentably distinguishes over Suovaniemi et al and Fischer. Claims 3 and 11 (directly or indirectly depending from claim 1), also patentably distinguish over Suovaniemi et al and Fischer for at least the same reasons.

Rejections under 35 USC §103(a)

Claims 2 and 5-10 were rejected under 35 USC §103(a) as being obvious over Suovaniemi et al. (U.S. Patent No. 5,343,769) in view of Fischer (U.S. Patent No. 6,283,946).

Claim 2 depend from claim 1, which patentably distinguishes over Suovaniemi et al and Fischer. For at least these reasons, claim 2 also patentably distinguishes over Suovaniemi et al and Fischer for at least the same reasons.

The rationale of the rejection against claim 5 over Suovaniemi et al and Fischer is basically the same as that against claim 1.

Claim 5 also recites “a plunger whose tip face closely contacts an inner wall surface of the metering tube.” Also, like claim 1, claim 5 has been amended to recite, “a controller controlling a rearward movement process of the plunger to a first position while the liquid

material supplying valve is in the open position and the discharge valve is in the closed position, and a forward movement process of the plunger from a first position to a second position to discharge a first droplet, and from the second position to a third position to discharge a second droplet, while the liquid material supplying valve is in the closed position and the discharge valves is in the open position, thereby the liquid material supplied in the metering tube in a single supplying step is discharged from the nozzle in a plurality of steps of moving the plunger forward, wherein the controller controls a moving speed of the plunger from a start of a deceleration to a stop of the plunger in the steps of moving forward and stopping the plunger such that the first droplet and the second droplet are of the same quantity.”

For basically the same reasons as discussed regarding claim 1, claim 5 also patentably distinguishes over Suovaniemi et al and Fischer. Claims 6, 7, 9 and 10, depending from claim 5, also patentably distinguish over Suovaniemi et al and Fischer for at least the same reasons.

In view of the aforementioned amendments and accompanying remarks, Applicants submit that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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